REMARKS

The Examiner is thanked for the due consideration given the application. The specification has been amended to improve the language.

Claims 9-24 are pending in the application. Claims 9, 10, 14 and 15 have been amended to improve the language in a non-narrowing fashion. Claims 19-24 are new and find support in paragraph 0020 of the substitute specification and in Figure 1.

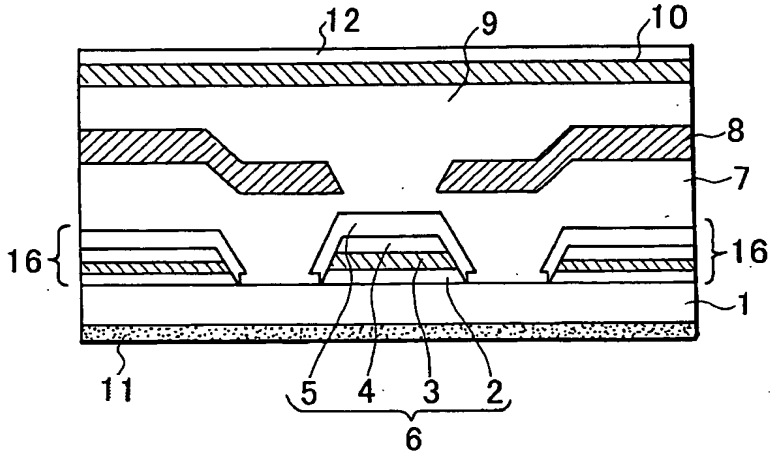
No new matter is believed to be added to the application by this amendment.

Rejection Under 35 USC §103(a)

Claims 9-18 have been rejected under 35 USC §103(a) as being unpatentable over SAKATA et al. (*IEEE Journal of Quantum Electronics*, Vol. 35, No. 3, March 1999) in view of CHUANG (Physics of *Optoelectronic Devices*, New York, John Wiley & Sons 1995). This rejection is respectfully traversed.

The present invention pertains to a laser having a double hetero mesa-stripe positioned to optimize compressive strain that is illustrated, by way of example, in Figure 1 of the application, which is reproduced below.

FIG. 1



The mesa stripe 6 includes a quantum well 3 sandwiched by optical confinement layers 2 and 4, and a cap layer 5 is over the structure. The mesa stripe 6 is surrounded on both sides by blocking layers 7 and 8. The p-type cladding layer 9 is not blocked by the blocking layers above the mesa structure. See new claims 19-24.

However, Figure 1 shows the post-growth status covering the current layer and the cladding layer, and it therefore appears that the p-type blocking layer and the p-type cladding layer as being integrally formed, which is inconsistent with the function of the current blocking layer as shown in the manufacturing process in Figure 2 of the application. In the present invention, the current path is formed on the active-layer mesa.

The laser geometry of the present invention permits the utilization of the average and critical compressive parameters set forth in equations 1 and 2:

[Equation 1]

$$\varepsilon\ (\text{average}) = \frac{\sum_{i=1}^{n} (\varepsilon i \times di)}{d} \qquad d = \sum_{i=1}^{n} di$$

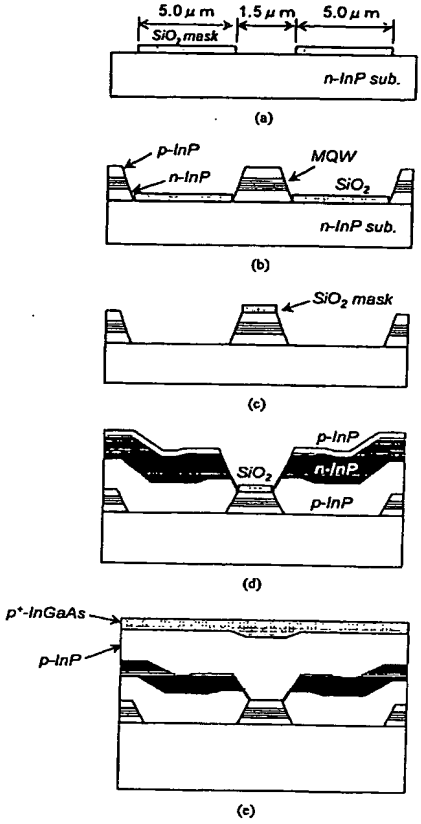
[Equation 2]

$$\varepsilon\ (\text{critical}) = \frac{b}{4\pi d} \cdot \frac{(1 - p \cdot (\cos\alpha)\hat{}2)}{(1+p) \cdot \cos\lambda} \cdot \{\ln(\frac{d}{b}) + 1\}$$

The optimal and novel strain relationship is set forth in independent claims 9 and 14, which state: "an average strain amount ε1(average) of the double hetero mesa-stripe is a compression strain (ε1(critical) ≥ ε1(average) > 0, and

an average strain amount ε2(average) of the recombined layer is a tensile strain (-ε2(critical) ≤ ε2(average) < 0) not more than a critical strain amount ε2(critical) or zero strain (ε2(average) = 0)."

SAKATA et al. pertain to multi-quantum-well buried heterostructure laser diodes. The Official Action refers to Figure 1 of SAKATA et al., which is reproduced below.



Although Figure 1 of SAKATA et al. shows a quantum well structure, there is no indication of elements, such as a cap layer, that could create the compressive strain relationship of the present invention.

In SAKATA et al., the semiconductor laser forms the waveguide using a selective growth method analogous to that of the present invention. However, SAKATA et al. fail to disclose or suggest if the average strain amount relates to the compression strain or the tensile strain the double hetero mesa-stripe and the recombined layer, respectively.

At page 3, lines 6-7 the Official Action asserts that equations 1 and 2 would be inherent in SAKATA et al.

However, there has been no showing of how the mathematical relationships of equations 1 and 2 would be inherent in SAKATA et al. Even if inherency could be shown, this would be no bar to patentability because SAKATA et al. fail to recognize the importance of these mathematical relationships.

Accidental results not intended and not appreciated do not constitute anticipation. *Eibel Processing Co. v. Minnesota and Ontario Paper Co.*, 261 US 45 (1923); Mycogen Plant Science, Inc. v. Monsanto Co., 243 F.3d 1316, 1336, 5 USPQ2d 1030, 1053 (2001). The Federal Circuit stated in *In re Robertson*, that "to establish inherency, extrinsic evidence must make clear that the missing descriptive matter was necessarily present in the thing described in the reference, and would be so recognized by persons with ordinary skill. Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a set of circumstances is not sufficient." *In re Robertson*, 169 F.3d 743, 745, 49 USPQ2d 1949 (Fed. Cir. 1999). Further, it has been held that the mere fact that a certain thing may result from a given set of circumstances is not sufficient, and occasional results are not inherent. *MEHL/Biophile International v. Milgraum*, 192 F.3d 1362, 1365, 52 USPQ2d 1303 (Fed. Cir. 1999).

At page 3, lines 8-10 the Official Action acknowledges that SAKATA et al. fail to disclose average strain amount of double hetero mesa stripe is a compression strain and an average strain amount of the recombination layer is a tensile strain. The Official Action then refers to pages 437-444 of CHUANG.

CHUANG at page 437, lines 20-22 states "that by using a compressively strained quantum-well structure, semiconductor lasers with a lower threshold current density can be achieved." Page 444 of CHUANG discusses how a strained quantum well produces a gain spectrum.

However, there is no teaching or inference in SAKATA et al. or CHUANG of the specific relationships of "$\varepsilon 1(\text{average})$ of the double hetero mesa-stripe is a compression strain ($\varepsilon 1(\text{critical}) \geq \varepsilon 1(\text{average}) > 0$" and "($-\varepsilon 2(\text{critical}) \leq \varepsilon 2(\text{average}) < 0$) not more than a critical strain amount $\varepsilon 2$ (critical) or zero strain ($\varepsilon 2(\text{average}) = 0$)," such as is set forth in independent claims 9 and 14 of the present invention.

That is, page 3 of the Official Action infers that in light of SAKATA et al. it would have been easy to adopt the double hetero mesa-stripe having the compression strain in order to reduce the threshold value, and to adopt the recombined layer having the tensile strain in order to output the coherent light of the TM polarization.

However, it is not possible in both of SAKATA et al. and the present invention that "the coherent light of the TM

polarization is outputted," even though the average strain of the recombined layer that does not output the laser is the tensile strain.

As far as the quantum well layer which outputs the laser has the compression strain, it is the TE polarization, as described in CHUANG.

That is, regarding CHUANG the point of argument is that the characteristics are different when the quantum well laser which outputs the laser is subjected to the compression strain and the tensile strain. However, the reference fails to imply the constitution of the present invention where the average strain of the recombined layer which does not output the laser is the tensile strain.

Further, the compression strain recited in CHUANG is for the active layer, and the reference fails to imply the constitution of the present invention where the average strain of the entire layer of the double hetero mesa-stripe is the compression strain.

The applied art thus fails to disclose or suggest the semiconductor of the present invention, where the average strain of the entire layer of the double hetero mesa-stripe is the compression strain, and the average strain of the recombined layer is the tensile strain.

One or ordinary skill and creativity would thus fail to produce independent claims 9 and 14 of the present invention from

a knowledge of SAKATA et al. and CHUANG. A *prima facie* case of unpatentability has thus not been made. Claims depending upon claim 9 or 14 are patentable for at least the above reasons.

This rejection is believed to be overcome, and withdrawal thereof is respectfully requested.

Conclusion

The Examiner is thanked for considering the Information Disclosure Statement filed May 26, 2006 and for making an initialed PTO-1449 Form of record in the application.

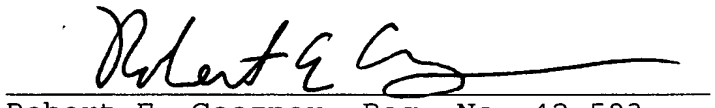
Prior art of record but not utilized is believed to be non-pertinent to the instant claims.

The rejection is believed to have been overcome, obviated or rendered moot and that no issues remain. The Examiner is accordingly respectfully requested to place the application in condition for allowance and to issue a Notice of Allowability.

The Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 25-0120 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17.

Respectfully submitted,

YOUNG & THOMPSON



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